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Author: Paul C. Gailey
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A Science of the Whole

Paul C. Gailey
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Preface

This document began with a phone call from Jeremy Waletzky this past Spring asking me to reconsider Mr. Fetzer's original goals with respect to subtle energies. What can the Fetzer Institute do now to substantially advance our understanding of subtle energies from a scientific viewpoint? If he were alive now, what avenues might Mr. Fetzer want to pursue in light of the current scientific knowledge and reported subtle energy phenomena? At my request, Fetzer staff assembled copies of Mr. Fetzer's key writings for use in developing this document.

Jeremy and I spoke again later by phone and he and Rob then convened a small meeting at the Fetzer Institute in June to gain a broader perspective on the question. Present at that meeting were Jeremy Waletzky, Rob Lehman, Tom Inui, Bruce Fetzer, Bruce Carlson, Lynn Underwood, Jan Walleczek, and myself. We had an animated discussion that brought up many points about the spirit of Mr. Fetzer's intentions, past efforts, and how such work might fit into the Fetzer Institute's current activities.

One result of this meeting was that it broadened the scope and goals of the project by adding closely related questions that must also be addressed. For example, do the physical sciences have a viable place in the Institute's mission? Is it reasonable to expect that significant results can be gained from a Fetzer presence in this area? What is unique about such efforts? How do such efforts fit with other Fetzer activities? It was clear from the discussion that whatever might be said about scientific pursuit of subtle energies at the Institute must be cast within the larger context of the Institute as a whole and its overall mission.

In mid July, I met with the Biodynamics group for two days to discuss these questions and gather input regarding the history of science-related projects at the Institute. Similar questions about program direction have arisen in the past, and the gathering of this historical perspective improved efficiency and helped to avoid covering old ground. Later, in August, I spent a week at the Fetzer Institute to meet with program staff. As will be pointed out in this document, it has become ever more apparent that our work can move in a direction that bridges the gaps between our many approaches to truth – in a direction that recognizes the similarity in our common goals. The week spent at the Institute was extremely productive as perspectives were exchanged and ideas discussed for shared efforts.

The meetings described above, along with much contemplation and research, served as the basis for this document. I attempted to reach into the heart of the questions posed and view them in a creative light relevant to the present world we live in and the realities of what the Fetzer Institute can reasonably expect to accomplish. Mr. Fetzer was a remarkably influential person because his purity of heart was aligned so completely with his clarity of purpose. Working, as we all are, within the manifestation of his intention, I am struck by the opportunity he has bequeathed us. This document is simply my best effort to carry forward and build upon his love, and the potential for spiritual growth he recognized in the physical sciences.

The document is composed of three major sections. The first section is designed to provide context for the rest of the document. It raises and addresses fundamental questions: Why should we be concerned with the physical sciences at the Fetzer Institute? Science is already an

extremely successful enterprise and an important part of life. There are major government and private funding agencies that are supporting science. How could the Fetzer Institute make a significant contribution that would enhance the spiritual dimension of life? Further discussion of possible directions hinges entirely on the answers to these questions and so section one creates the needed background for the rest of the document.

Section 2 then moves a step further to paint a vision we might aim for. Is there a science that can help us on our journey towards wholeness and greater awareness? What would such a science look like? How would it contribute to our healing and growth? This section better defines how we might venture to enhance our role in catalyzing a greater unity of understanding. Section 3 completes the circle of our journey into these ideas. Here, practical possibilities for our work are outlined. This section is actually an invitation for all of us to explore a new and deeper dimension of our being, bringing together long-divided sides of our nature that are now ready to be reunited. Although much ground is covered in the report, it is intended to serve primarily as a starting point for a deeper conversation on the subject.

This report benefited immensely from many wonderful conversations. Jan Walleczek has spent hours with me by phone, at scientific conferences, and at Fetzer meetings. A deep thanks also goes to Arnold Mandell for his support and penetrating insight on many levels, and to the rest of the Biodynamics Group for thoughtful discussions and continued support. I am deeply indebted to Joel Elkes for his well-known compassion, depth, and support, in addition to the gift of his presence, which defies description by adjectives and the like. Bruce Fetzer, Jeremy Waletzky, Tom Inui, Rob Lehman, and Lynn Underwood all contributed to the formation of the tasks and ideas, and the enthusiasm and support of all the Fetzer staff is also deeply appreciated. I would especially like to thank Wayne Ramsey and Ruth Dobbins for the tireless support of all the Biodynamics group activities. Finally, I would like to express my gratitude for the opportunity to participate in this fascinating exploration of new possibilities.

Part I.
A View from the Other Side

The year is 2050, and the astral telephone is finally complete. Appreciative of his research support from the Fetzer Institute, the inventor decides to make his first call to Mr. Fetzer himself: "Hello..., Mr. Fetzer, is that you? A number of us are gathered around here for this momentous occasion. We'd like to thank you and hear your thoughts about our work, how we got to this point, and the directions the people of earth are progressing. Is there anything you can share with us?"

Mr. Fetzer: Well, this is just wonderful, and I've been waiting to hear from you for some time (even though we don't have time in the conventional sense here). Before we really get started, I'd like to emphasize that my ultimate interest is in the most important quality of all – Divine Love. My interest in subtle energies is intended to help mankind reach their greatest expression of wholeness through this state. While I've expanded in my understanding of Divine Love, its place as the centerpiece of any and all endeavors remains forever intact. True accomplishment is only realized when Divine Love is both the pure motivation for action and its uncompromising goal. I mention this point here at the start because it is the fundamental unifying principle supporting all our work, and thus the guiding force for our efforts in the physical sciences.

It's very good to see how far knowledge and understanding have advanced. In my time on earth, I can remember the awful state of affairs that existed between scientific and spiritual endeavors. This fragmentation of the search for truth into opposing factions had a negative impact on society – creating confusion and a real lack of wholeness. Trying to pursue truth by denying aspects of the whole just won't get one very far. So I am indeed impressed by the greater unity of perspective that now exists. Wholeness of body, emotions, mind, and spirit are essential for our real work. I'm pleased that the Fetzer Institute was able to play a key role in catalyzing this revolution. Considering how entrenched many were in the dualistic viewpoint, this is a real accomplishment.

In those days, the scientific community adopted a smug and arrogant attitude based on their ability to explain so much of the physical universe. In combination with their success in freeing humankind from so many physical hardships of the past, they fell into an illusion of true invincibility. They thought that nearly all the answers could be wrapped up and put in a box except for the details that were being worked out through current research. The attitude was bad enough, but the real harm came from their dogmatic adherence to a mechanistic, clockwork view of the universe that left absolutely no room for the human spirit. Life, they claimed, was a cut and dried series of almost completely understood mechanical processes driven by random chance. Effectively denying their own axioms (from quantum mechanics) that the observer must be considered a part of any situation, they somehow persisted in a Cartesian-type separation of the viewer (never considered) and the observed. By the end of your twentieth century, the voices of great minds like Einstein and David Bohm (who perceived a greater wholeness of reality) were no longer heard and an almost imperceptible kind of heaviness descended. The "scientific" view of life coming from both the biological and physical

sciences considered mankind as just an accident, and ideas of spirituality were seen as primitive fantasies of the uninformed.

Of course, many people didn't buy this proclamation from scientists serving as self-appointed authorities on larger questions about life. They set about pursuing their own spirituality, many in open opposition to the scientific view. This move towards self-survival was necessary, but it of course created a polarity, and one can only go so far in reactionary pursuits. People in this group sought out spiritual teachings to understand and fill this essential part of their nature, but then ate at the table of science for the rest of their sustenance. One might say that the twentieth century was the century of dependence on science. Nearly everyone on the planet depended on science to feed, clothe, heal, and entertain them in ways unimaginable during the preceding thousands of years. This lack of reconciliation created a rift in the psyche that was almost imperceptible yet extremely damaging. People were forced to compartmentalize or segment their realities. One reality worked for their inner life while another worked for their outer needs. Though people spoke about and yearned for unity, the rift between these perspectives spoke loudly by its very existence. We all know that the real work means addressing real problems with true and dedicated effort, but this one wasn't obvious. As I've said before, many people chose to just view science as an unnecessary evil, thereby condemning themselves to the limits of duality.

Interestingly, this particular problem did not arise from a lack of knowledge – quite the opposite. The abundance of knowledge led to the illusion that the entire workings of the universe were nearly understood. What was so desperately needed was a fresh perspective. Just as adolescents eventually outgrow their haughtiness, society needed to outgrow its limited and self-aggrandized view of its knowledge. I'd like to be specific here and recount what was missing. It's so obvious now, but was so hard for society to discover at that time. Science desperately needed to give up its primitive belief in the possibility of building "a bottom up" description of phenomena. They were stuck on the idea that everything can be explained by reduction to some set of component parts and the physical laws that govern them. Western science had been propelled partly by the need to drive away irrational fears (e.g. diseases came from evil spirits), but they were stuck in high gear and carried this motivation to a need to button up and explain everything (whether or not the evidence was really there to support such a view). They proceeded to strip away the mystery of life and only a few realized that humans need the unknown as much as they need food and water. The pretense of a near complete understanding of life was clearly as unhealthy as it was wrong.

Science denied the possibility of causes outside the workings of random chance and physical law. Thus, there was left no room for meaning – the very essence of a spiritual perspective. They adopted a reflexive disdain for any claim of effects that might lead back to an understanding of a purposeful universe or a reason for life. This vice grip of fear was exactly counter to the spirit of true exploration - the wonderful, open-ended drive to reach into new realms of understanding. The attitude obviously slowed efforts to unravel the mysteries of challenging areas such as subtle energies, a subject of central interest to me. I pushed for investigations of subtle energies for several reasons: First, I felt that such an understanding would lead to vastly improved methods of healing, and health is of great importance in one's spiritual journey. Second, I thought that the recognition of these vital human dimensions would

help people understand their spiritual nature and lead to a deeper sense of wholeness – of connection between the physical and non-physical dimensions of life. As an entrepreneur, I was also interested in the opportunities so many would experience through these advances.

I recognized that the world would benefit enormously from a science of the whole that fit seamlessly within an overall spiritual context. Not only would the individual be re-inspired to explore their deeper connections with the life of the whole, but the enactment of scientific understanding would be performed in the context of wholeness. The dualistic separation of the self from the world around had already led to near ruin of the planet through neglect of effects and side effects. Individuals lacking wholeness can hardly be expected to act from wholeness in making decisions. The neglected effects stacked up in the form of pollution, global warming, various ecological disasters and other problems. Wholeness was desperately needed in all areas of human pursuit including science, which assumed such a central position in decisions that affected our well-being.

Though not widely recognized, science had actually become the common denominator of the age. Scientific results and values crossed cultural lines like nothing else in those days. Though tongues, customs, religion, and lifestyles differed across borders, the language of science was spoken by nearly every culture. So the possibility of ignoring science in a pursuit of wholeness was clearly impractical. The provider of one's daily bread cannot be easily forgotten. As I pointed out in my Founder's Statement, *we must have the understanding of the body, mind and spirit and we must have balance of the physical, emotional, mental, and spiritual in order that we might fully find the true spiritual expression leading to complete healing. Otherwise, we will come from places of limitation.*

It is only through the exemplified life that one can share and, in a sense, teach. So, if the Foundation was to succeed in its goal of achieving balance and health it needed to find ways to work together within itself as a unified unit in order that it could go forward in the world and live the example. This meant healing the rift between science and spirituality within the Institute. This polarization was our starting point because it was the perfect reflection of the larger differences existing within the world. In a speech to the World Conference in 1988, I mentioned that *a spiritual-minded philosophy often looks at science as an unnecessary evil and that we needed to recognize that both viewpoints have the right to exist where there is a mutuality of purpose.* Though it had become trapped in its own mental boxes, science, from its beginnings has always been a pursuit of truth. It is interesting how the many different pathways to truth sometimes compete with each other. But they always do so at the expense of wholeness and harmony. An essential feature of any higher love is that it acknowledges and respects all the many forms of expression.

I was always impressed by the marvels of the physical world and spent time wondering how science and other approaches to spirituality could inform each other once they both accepted wholeness. This is a fascinating area that was a great benefit for those who spent time really exploring it. As I repeated in my Founder's statement, *energy scientific research that is not accompanied by spirit is suspect.* Spiritually directed scientists, on the other hand, quickly recognize the interconnectedness of life and are willing to explore new concepts that extend beyond the limited view of existence.

This ability to look more to the whole had the potential to open the doors to energy medicine and to redefine “reality” in new terms. A truly adventuresome spirit was needed to make the leap to whole new ways of looking at and studying the physical universe. Pioneers like Bohm and Einstein revealed the courage, integrity, and depth needed to walk this path of wholeness. They were willing to ask the big and hard questions and pursue them with the rigorous discipline of true scientists. Just as monastics commit to rigorous discipline, scientific inquiry requires dedication and commitment to be successful.

These scientists had substantial impact because their findings spoke through the discipline of science. Colleagues knew Bohm as a man of great integrity and credibility. His honesty was revealed through the care he took in developing his ideas, and the respect he had for the base of knowledge and experience already gained by scientific inquiry. His findings were not born from fancy, but rather from the creative drive working through a trained and informed mind. I’ve quoted Einstein before in saying, “The most beautiful and most profound emotion we can experience is the mystical. It is the source of all true science.” This is how spirituality informs science – at its very heart through inspiration, direction, and an understanding of wholeness.

Viewing in the other direction, science informs spirituality simply because it is a sincere pursuit of truth as it is expressed in the physical universe. Interestingly, Tibetan Buddhists have long taken an interest in scientific findings as the study of “what is.” Contemplation upon the workings of Divine Spirit in the creation and maintenance of the physical universe can be viewed as a form of prayer or worship. Because science had become such an important part of life, its view of life played a central role in the average person’s outlook. An important goal for the Institute became the expansion of the scientific viewpoint so that it recognized the mystery and unity of creation. Such an acknowledgement would make it easier for people to experience their wholeness through the findings of the physical world in greater harmony with their inner experiences and chosen religious practices. Because life reflects itself through many different perspectives, scientific findings offer another opportunity to understand ourselves through nature.

In the late twentieth century and early twenty-first century, science and most of medicine continued to objectify the individual. As more and more body functions were studied in greater and greater detail, the distinction between “inert” matter and living organisms functionally disappeared. This meant that a visit to the doctor or hospital often had a severe de-humanizing effect – treatment was only a skirmish between scientific understanding and the “random chance” good or bad fortunes of the physical matter of one’s body. The modern triumph of driving away the fear of unknown “evil spirits” took with it the meaning of one’s life. Individuals were reduced to mere bystanders as science and randomness did battle. There was no room for seeing the individual as a divine being and no place for a Divine Spirit weaving it all together with love and meaning. Randomness, which by very definition is “no-meaning”, was considered the driving force of the universe.

Many forms of alternative medical practice sprung up to directly confront this problem, but the powerful viewpoint of mainstream medicine and its ultimate dependence on science set the pervasive tone of age for most people. What was needed was a science of the whole – one that

recognized the connections between the individual and the rest of life. I saw subtle energies as a direct link to this broader viewpoint. Once science recognized that the individual was more than the matter of their bodies, a greater space would be opened for the individual to do the same. The lessons of unity and wholeness they experienced in their inner life would be reflected and enacted in all approaches to health and healing.

The Fetzer Institute's niche was to advance science itself to develop the tools needed to study subtle energies. Our early efforts to make head-on attacks of subtle energy phenomena were not terribly successful and as time progressed, it became clear that other organizations and even the federal government were pursuing this approach. Our analysis suggested that whole new ways of viewing and studying phenomena were needed, as were new mathematical and conceptual tools. In my 1988 speech to the World Conference, I pointed to Einstein's statement that a paradox could never be solved on the level from which it was created. We had to find a way to reach beyond the limited view of the age.

The Institute demonstrated its unique leadership role by forging a whole new path that was sorely neglected at the end of twentieth century. That was to work within the scientific framework, pointing out the fruitful avenues that had been overlooked, and expanding, if you will, the consciousness of scientific thought. This approach was truly revolutionary and one that no other institution of the times had recognized and pursued. Such a path required discipline because it had to be built on a credible foundation of real science. It was a daring pursuit because science subjects all results to severe scrutiny. But in the end, we were looking for real applications of subtle energy phenomena – real enough to meet any level of inspection.

The unity and wholeness of the universe tells us in advance that all true investigations will eventually lead to the same ultimate reality. Early efforts to "prove" subtle energy phenomena were motivated partly by an interest in being able to hold before the scientific community proof indisputable that such effects exist. This proof would have the effect of shocking them into admitting that phenomena of this type are possible. While this is a logical strategy in some respects, it is not very harmonious with what we know about spiritual growth and expansion of awareness. People go through their lives constantly with evidence of the causes of their problems all around them. We see what we are ready to see and seldom more. Shocking people into seeing something they are ignoring sometimes works, but it is not the most natural way for consciousness to evolve. More commonly, love and grace provide the means for consciousness to expand. Then obstacles dissolve and new opportunities arise in the light of a greater awareness.

The growing awareness of the rest of the world was already putting pressure on science to expand its viewpoint, but much of the early response was only the polarization I spoke of earlier. The framework of science at that time simply did not provide a good way for such expansion to occur. What was needed was a new perspective, a way of thinking about and studying the physical universe that was more in harmony with wholeness and the concepts of subtle energy. In spite of many surprising scientific advances in the twentieth century, the pervading view was based on a mechanistic reductionism. The concept is simple yet insidious – it assumes that anything can be understood completely by breaking it down into component

parts (like atoms and molecules) and then studying how they fit together to make a clockwork-like mechanism.

The insidious part has to do with a kind of subjugation that results. Once the components and forces are known, scientific understanding results in the ability to control from the outside, thereby removing any sense of autonomy from the subject of study. Only in the last 20-30 years of the twentieth century was substantial success achieved in applying this philosophy to the human body. In truth, the function of the body was very poorly understood, but enough success was achieved through this approach to embolden leading scientists to proclaim that a complete mechanistic understanding of the body was within reach. Alas, humans would soon be shown to be nothing more than clockwork machines. And with this concept came the seldom spoken but thundering implication that there is no autonomy, no meaning to life, and no spiritual self. Within the scientific community, this view became widely accepted as the vogue new existentialism.

Scientific thought and methods had arisen in a very limited context. In order to reduce complication, processes were studied in isolation. A favorite technique in science was to focus on one or a few parts of a complicated process and attempt to separate these parts from other influences. Further simplification was achieved by considering only the proportional or linear part of processes. Almost all the mathematical tools available at the time had been developed for such linear processes and so nonlinear processes were ignored or approximated using linear models. This approach was employed for so long that most scientists never bothered to think about the implications of isolation and linearization on their worldview. From the start, it was doomed to a segmented view of the universe.

Nowhere was this consequence more evident than in biology. Extremely detailed mechanistic models were developed for as many parts of the body as scientists could isolate from the rest of body. But no one had the faintest idea how these parts worked together in near perfect harmony to produce “health.” Medical treatments almost always focused on correcting some particular process with no insight into the whole. As a result, side effects and iatrogenic diseases were rampant. Cancer treatments, for example, were based on poisoning the body with the hope that the cancer cells would die before the rest of the body did. We knew there had to be a better way.

After studying subtle energy phenomena for some time, we noticed a number of common features between them:

1. They seemed to be acting on systems with extreme sensitivity. Whatever the forces of subtle energy therapies were, they clearly were not strong in the normal physical sense. Great healings may result, but the mode of interaction had to be small – it certainly was not easily detectable by physical measurements.
2. The results of treatments seemed to depend on the state of the individual. Some people seemed to benefit enormously, while others were helped only a little or not at all. Studies of subtle energy phenomena usually did not provide support for their reality in the statistical sense.

3. Treatments seemed to result in state transitions. In other words, subtle energy treatments seldom addressed the minute details of a disease. Instead, they simply resulted in an overall transition from a disease state to a state of health. Disease and health appear as distinct states, quite in contrast to the detailed mechanistic concept that defined everything in terms of parts.
4. Treatments often involved concepts of resonances and vibrations. Such terminology was common among subtle energy practitioners even though scientists had great difficulty in trying to measure any physical quantities in conjunction with subtle energy practices.

One of the new areas of science that was best able to address these issues was known as nonlinear dynamics. It had already proven that certain types of “chaotic” systems were extremely sensitive to small perturbations or changes. This result was very different from the findings of most of “linear” science, which suggested that effects of some influence are usually proportional to the size of the influence. Within that thought framework, the idea of significantly changing natural systems with a small perturbation was considered preposterous. This was part of the reason for the widespread skepticism of subtle energy phenomena. Even though nonlinear dynamics had its roots in the work of Henri Poincare in the early twentieth century, its concepts were not developed until late in the century and the profundity of its implications were still not recognized at the end of the century.

Other findings in the field included the ability of simple nonlinear systems to “self organize” into highly complex patterns and behaviors. This result meant that entirely new levels of reality could “emerge” from the nonlinear interactions of simpler components. The emergent behaviors did not require a strange new physics in order to occur, but they were nevertheless irreducible – they required a new description at their own level of reality and could not be reduced to explanation and prediction in terms of the component parts. We found this particularly important because it so easily matched our everyday experience. It meant, for example, that the behavior of a colony of ants could not be predicted by studying the individual ants or their interactions. But from these interactions, new patterns and modes would arise that displayed a richness and complexity of their own and would require a description of their own. The same thinking showed that thought could not be reduced to an explanation in terms of individual neurons. In addition to directly challenging the mechanistic, clockwork view of the body, this understanding provided a basis for recognizing the reality and irreducibility of subjective states.

The dynamical view carried with it a richness of new and penetrating principles that provided the first scientific framework for studying subtle energy phenomena. For example, not only were some types of nonlinear systems extremely sensitive to small influences, but the effects of these small influences depended entirely on the state the system was in when disturbed. Self-organized systems could develop numerous possible states and small influences could easily cause shifts between states. Within this conceptual framework, we began to see how health and disease could be viewed as unique states and how subtle energy treatments might be aimed at bringing about the needed transitions.

Many of the emergent states of self-organized systems observed near the end of the twentieth century involved oscillations or vibrations. One of the striking properties of these systems was observed when two or more of such systems were weakly coupled together. Under the right conditions, these systems would begin to synchronize in either overt or subtle ways. This synchrony was also known as “coherence” or “long-range coherence” when it occurred over distances large relative to the individual units. A Dutch scientist named Huygens first noticed this effect while sick in bed. He had placed two pendulum clocks on the mantle and noticed that no matter how they were swinging when he started them, they would eventually begin swinging in synchrony. Extremely tiny vibrations traveling through the mantle were enough to bring about this synchronization through nonlinear processes. We recognized that such effects bore an interesting similarity to claims of healers that they were matching vibrations with their subjects.

The nonlinear dynamical perspective contained all the ingredients needed to explore subtle energy phenomena. Yet, many important challenges remained. While there was some recognition of the importance of nonlinear dynamics within the scientific community, the long-held fixation on mechanical reductionism persuaded nearly all scientists to attempt to distort the study into that old paradigm. At the end of the twentieth century, most scientists using the tools of nonlinear dynamics still tried to apply them to isolated systems in order develop a reductionistic understanding. They didn’t yet have the scope of understanding to approach the fact that self-organizing systems build one upon another to produce layers and layers of complexity and emergent phenomena.

For example, the firing of a nerve emerges from the behavior of hundreds of thousands of ion channels in the cell membrane of the nerve. Moving up a level, tens to hundreds of thousands of nerves can fire in synchrony to produce modes of oscillation in the brain. Somehow at yet higher levels, thought emerges, and from the multiplicity of thought, behavior arises. Next, we can think of the individual in their family and the complex modes that can emerge from those interactions. Layer upon layer of complexity is built from the microscopic components of the body to the life of cities, nations, and the world. Though a stretch of the imagination, we have no reason to suspect that the intertwining of self-organization and emergence ends there. Most honestly, one has to recognize that the universe is interconnected from the smallest to the largest scales. Here, at last, was a scientific framework for thinking about the truths known for so long to the mystics.

Bringing about constructive change was not an easy task. Nonlinear dynamics was relegated to a small corner of scientific thought in those days, even though it hit the level of news for some years. We had to find a way to bring about convincing demonstrations of these principles that had been discussed, but that had not yet made a significant impact. The situation reminds me of the earlier part of the twentieth century when quantum mechanics was the news of the day. These discoveries clearly showed that one cannot really separate the observer from the observed – the two clearly interacted with each other. Great scientists like Einstein, Bohm, and Jammer explored the important implications of these findings, but their voices gradually faded from the scene. It seemed that the scientific community was not prepared to grasp the startling implications of these results.

Other than these individual efforts, there was no organized effort to address these issues – there was no basis for a community of scientists to form around the new thinking. Governments and industry were interested in more pragmatic issues and provided no impetus for developing the new ideas. At the end of the twentieth century, a similar situation was occurring with nonlinear dynamics. It was providing a doorway for exploration of subtle energy phenomena and a holistic view of life, but its voice was only briefly heard amidst the din of more mundane interests. This is where the Fetzer Institute was able to make a difference. Because it was motivated by the desire to facilitate a greater understanding of Divine Love and wholeness, it brought a unique energy to the scene. The Institute played an important role in cultivating the needed changes by providing a focal point for the evolution of thought and the expansion of perspective.

There were several practical ways the Institute was able to catalyze constructive change. First, it was able to support research aimed at building the framework for a holistic perspective. Nonlinear dynamics research was already underway in various places around the world, but was typically forced to conform to the currently prevailing conceptual framework, that is, it had little room to deviate from the mechanistic reductionism of the day. There was no community supporting the broader purpose, so the Institute served a unique role in establishing this intention and creating the needed space.

The effectiveness of the Institute's efforts resulted from both its intention and the credibility it established. A number of organizations and individuals gained recognition trying to broker some kind of peace between science and various spiritual pursuits, but they were generally ineffective within the hard science community. Though sometimes well received in certain circles, they did not impact the physical and biological sciences simply because they did not speak the same language. People must be met on their own ground when confronted with major changes in worldview. The fact that the Fetzer Institute spoke credibly with high-quality, forefront research established it as a voice to be heard. This standing enabled the Institute to attract the more adventuresome of the credible scientists to the work and provided them a safe space to build the needed community. There were always scattered voices within science pointing out the greater, enabling view of life, but the real force for change could only come through the relationships born in a community of like-minded thinkers.

The Institute adopted a multi-faceted approach for accomplishing its catalytic role. On the research side, projects were chosen that demonstrated the important principles that would pave the way for understanding subtle energy phenomena. An awareness of developments in subtle energy phenomena was maintained watching for opportunities for convergence. Patterns and similarities in these studies were able to inform needed research directions. Similarly, Institute scientists watched for subtle energy phenomena that might be amenable to study through the developing techniques of nonlinear dynamics.

Dynamical theory encouraged us to reconsider the way problems were formulated for scientific study. For example, the effect of small influences on self-organized systems depended very much on the details of their initial state. A kind word spoken to an angry person, to illustrate this simply, may have a very different effect than a kind word spoken to a sad person. Because initial states can be difficult to characterize, experiments on state-dependent systems could

show apparent inconsistencies. We recognized that a better understanding of such effects might substantially improve our ability to study and understand subtle energy phenomena. Concepts such as this motivated new ways of designing experiments and new methods for analyzing results.

The Institute worked to build community through fellowships, frontier meetings, and special gatherings aimed at creating space for a more expansive scientific perspective. Where appropriate, it provided support for well-respected scientists to push their work into new frontiers not recognized by funding agencies. By including forward-thinking agency personnel in certain meetings, we were able to encourage the much-needed transformation to a broader perspective.

It was the expansion of awareness and understanding brought about by pure intention through research and the building of community that enabled new discoveries to break through the rigid thought patterns of that age. History has always shown us that a few leaders courageous enough to do the real work show the way for others. We played a small but critical role by working with integrity and wholeness, conducting groundbreaking research, and by building the new framework of thought that was needed. As new insights and tools of investigation were developed, we helped construct the first truly illuminating ways of understanding subtle energy phenomena. And perhaps just as importantly, we facilitated the blossoming of a new wholeness in scientific thought providing an important key to the health of the individual and society.

The rest, as they say, is history, so I'll end our discussion here. Keep up the good work and remember above all to be guided by this final passage from my founder's statement: *"... whatever the final verdict turns out to be, its summary will be unconditional love. This is our avatar of the future, because love is the unifying energy field that mobilizes the physical, emotional, mental and spiritual resources in the caring and sharing with one another."*

Part II.
A Science of the Whole

A human being is a part of the whole, called by us "Universe," a part limited in time and space. He experiences himself, his thoughts and feelings as something separated from the rest - a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty. Nobody is able to achieve this completely, but the striving for such achievement is in itself a part of the liberation and a foundation for inner security.

- Albert Einstein

With the advent of the twenty-first century is also arriving our best opportunity to advance a *science of the whole*. For more than two millennia, the search for scientific truth has developed towards the core belief that all of reality will be revealed when the component parts are understood. This reductionism proved dramatically effective in revealing many of the fundamental laws of nature. It has enabled us to improve living standards in ways that would certainly have been considered magical during previous ages. In the midst of this success, however, we are now finding that the picture of reality being painted by science is leaving less and less room for our spiritual experience of life. Subjective experiences such as healings, growth to new levels of awareness, and even the wonders of love are continually reduced in concept to randomly driven movements in a mechanical universe.

A return to wholeness would seem unlikely in the face of all this success, but at least two forces have made such a transformation possible. First, as discussed already, large numbers of people around the world are experiencing spiritual awakenings in various forms. Their experiences of wholeness and connection stand in stark contrast to the message of modern science. Second, science itself is beginning to bump up against the limits of reductionism. Scattered, lone voices can be heard as individual scientists begin to recognize that not all of reality can be understood by looking only at parts. The two quotes below illustrate this point:

*"The 21st century discipline will focus increasingly on the study of entire biological systems, by attempting to understand how component parts collaborate to create a whole. For the first time in a century, reductionists have yielded ground to those trying to gain a holistic view of cells and tissues." [Science, Vol. 287, March 10, 2000 E. Lander and R. Wienberg, *Genomics: Journey to the Center of Biology*].*

In same article, the authors outline the challenge before us:

“The understanding of the human genetic circuitry that will provide cures for countless diseases may also lead some to conclude that humans are but machines designed to play out DNA cassettes supplied at birth – that the human spirit and human potential are shackled by double-helical chains. **So the most serious impact of genomics may well be on how we choose to view ourselves and each other. Meeting these challenges, some quite insidious, will require our constant vigilance, lest we lose sight of why we are here, who we are, and what we wish to become.**”

An even more forceful statement was made by one of our Biodynamics III participants in a recent book: “Reductionism *alone* is bankrupt, and systems models – at least of the entire nervous system – are so full of holes that the emperor might as well be naked. Here I reiterate a central premise of the present approach: no single level of description has ontological priority over any other.” [S. Kelso, *Dynamic Patterns*,” p. 229]

These statements are encouraging and show us that the time is ripe for the work that needs to be done. But a transformation of the type discussed here is at present only a vision. The glimmers of awareness showing up occasionally in the literature can easily be lost in obscurity as has happened so often throughout history. Consider, for example, the brilliant scientist Niels Bohr. Bohr was one of the key figures in the founding of quantum mechanics and a contemporary of Einstein. His work and interpretations of quantum mechanics continue to stand at the forefront of modern science close to a century later. Yet, his observations on wholeness have been mostly forgotten:

“Analogies from chemical experience will not, of course, any more than the ancient comparison of life with fire, give a better explanation of living organisms than will the resemblance, often mentioned, between living organisms and such purely mechanical contrivances as clockworks. An understanding of the essential characteristics of living beings must be sought, no doubt, in their peculiar organization, in which features that may be analyzed by the usual mechanics are interwoven with typically atomistic traits in a manner having no counterpart in inorganic matter.”

Bohr realized that the act of scientific measurement required isolation of parts from the whole, and since the qualities that make up life do not exist in isolation, the traditional scientific approach would fail in its attempt to study life itself. Here, from one of the greatest modern day scientists, we hear resonance with Mr. Fetzer’s clear perception that “as a dynamic force of energy, we are much more than mere chemical machines.” Unfortunately, the deep insights voiced by even great scientists like Niels Bohr and David Bohm have faded from view.

The challenge before us is to facilitate the growth and development of such concepts through a science of wholes – whole systems, whole organisms, and whole communities. Only through a growing recognition of wholeness can we begin to understand the many interwoven dimensions of life. Only a science that has learned how to see differently will begin to appreciate how life emerges from a base of matter but exists as an indivisible whole. From this acceptance of interconnectedness will come the possibility of understanding what we call “subtle energy.” Our vision is to help birth a new level of scientific understanding, to fulfill the

true originating impulse of our sojourn into parts by discovering their harmonious and contributing function in the life of the whole.

The Connection between Wholeness and Subtle Energy

Thus, the task is not so much to see what no one has yet seen; but to think what nobody has yet thought, about that which everybody sees.

- Erwin Schrödinger

Mr. Fetzer's writings address both wholeness and subtle energy in the same context. While the concept of wholeness speaks to us at many different levels (e.g. psychological, social, spiritual), less obvious is how it is linked to subtle energies. A close look at these concepts can yield powerful insights. To illustrate the concept of wholeness as simply as possible, we will consider the formation of convection rolls in a fluid. This effect occurs when a fluid is heated from below and exposed to a cooler top surface. When the bottom surface is first warmed, heat is simply conducted upwards through the liquid. But as the temperature of the bottom surface is raised above a critical temperature, the liquid self-organizes into a series of rolling cylinders. Suddenly, the featureless liquid develops a dynamic structure where no structure existed before. Our concept of the whole must now include not only the individual molecules, but also the dynamic rolling structure.

As a very useful exercise, let us take a moment to imagine how the world looks at the level of the molecules that make up a liquid that has self-organized into convection rolls. The liquid consists of unimaginably large numbers of molecules moving at average speeds of hundreds of miles per hour in all directions. Yet, some 100 trillion times per second, they collide with other molecules and travel only minute distances between collisions. These numbers are mind staggering, but it is important to get some idea of the roar of high-speed activity occurring at this level. Stepping back to our normal-sized world of observation, we see the large-scale, self-organized circular currents moving leisurely through the liquid at speeds **many thousands of times slower** than the random molecular motion.

This observation leads us to ask a simple question: If we could observe the world only at the molecular scale, how could we possibly detect the large-scale, self-organized motion of the fluid? If we could shrink ourselves to the size of molecules, we would see only high-speed molecules in constant collision. The self-organized convection rolls would be only an imperceptibly slow and subtle drift against a backdrop of violent and apparently random motion. If we limit ourselves to this scale of observation, the "*life*" of the whole will all but disappear from view. Only the most diligent observer who has some idea of what to look for could possibly detect this extremely subtle interaction. Somehow, out of the overwhelming roar of random activity, this mostly hidden, large-scale behavior emerges. Without the insight to find this hidden organization, our view of the world will be one of independent parts moving endlessly in random motion.

Convection rolls are a wonderful, but very simple example of self-organization (as are the vortices that spontaneously form in our bathtub drains). They can occur in liquids where every

component part (molecule) is identical. Yet, our understanding of this phenomenon is relatively new and still incomplete. A comparison of this simple model to groups of biological cells working together, to two individuals interacting, or to the life of social communities, is humbling. When living systems are considered, each interacting unit is in itself enormously complex and varied. Even cells with identical DNA exhibit a striking degree of uniqueness. We can barely begin to contemplate what might emerge from interactions between complex and varied beings like ourselves. The key is to recognize that other “levels” of reality are certain to exist when complex, nonlinear elements interact. We do not expect these realities to be obvious, and in fact, we expect that on the level of the interacting components, these realities, this larger “life,” will be all but invisible.

Biological organisms, societies, and ecological systems are vastly complex and we are barely in the preschool of understanding this complexity. Yet, the lessons of nonlinear dynamics are already providing insights – such as how tiny perturbations of nonlinear systems can result in enormous changes. Through this lens, we are not surprised to see that the most subtle shift in the mental state of a patient can affect a miracle of mind-body healing. We now have reason and even the beginnings of tools to study this subtlety at work in groups and communities. The “life” of the organism we call humankind has largely been invisible to us, but we have every reason to believe that this life works through the tiniest and most subtle interactions. What we call subtle-energy phenomena may simply be the relatively rare opportunities when we are privy to the workings of this larger life in which we all participate. Our attempts to study these phenomena under the lens of isolation may be entirely futile. Perhaps we are only beginning to awaken to the workings of the whole.

Herein lies the connection between “the whole” and “subtle energies.” Science began centuries ago on a path of reductionism with the dream that the secrets of existence could be understood once all the component parts were thoroughly studied. Now we are awakening to the realization that emergent properties are indivisible, that no one level of description can encompass the whole of reality. Although convection rolls arise from molecular interactions, they are almost invisible at that level and would likely never be discovered by observers unwilling to look at the whole. We should not be surprised that phenomena so familiar to those with a broad, spiritual perspective disappear under the lens of reductionistic scrutiny. Only with a *science of the whole* can we effectively search for and understand these subtle interactions.

With remarkable prescience, Mr. Fetzer recognized this concept. He saw that individual health and collective health were inextricably connected, as illustrated by his inclusion of wholeness and subtle energies into the same discussions. Speaking of the next steps for the human race, he stated that “This consciousness is one having to do with the collective synthesis, a coming together of the many into the one – recognizing that we are all equal, and all the same and *all of one body*.” While this concept surfaces often in our spiritual traditions, our actual perception of the life of this greater body has been only a faint outline. For the first time, we have scientific concepts that can help us to appreciate the reality of this whole and the subtle interactions that are the mostly hidden workings of its life. Understanding these “subtle energies” will not come from dissection of the whole any more than one can understand convection rolls in a fluid by studying a few molecules. Instead, we must use the new tools for exploring integration, emergence, and extreme sensitivity that are growing from the study of nonlinear dynamics.

Limits to the Impact of Scientific Descriptions

At this time, we cannot predict whether an understanding of subtle-energy phenomena will involve the discovery of new physical forces. But even if it does, this is unlikely to be the most important impact of such understanding. To illustrate this point, note that in recent years, science has identified dozens of simple substances called neuropeptides that are released from the limbic centers of the brain where emotions are seated. These neuropeptides are now known to modulate immune function and other physiological processes. Through this understanding, it appears that we are on our way to a physical explanation for the mind-body connection in health and healing. This knowledge is a wonderful verification of the truths found through other ways of knowing, and it will no doubt lead to more respect for emotional influences in healing. But it does not, by itself, lift us beyond the isolated, clockwork view of life. Instead, it could even diffuse some of the mystery of this incredible phenomenon and strip from us another source of wonder. The direction this knowledge moves us depends critically on the context of our understanding. Uplifting this context must be the heart of our work.

As discussed earlier, there are at least two ways to work towards the understanding and acceptance of subtle energy phenomena. One way is to track down and verify an existing phenomenon that stands up to scientific scrutiny and unequivocally demonstrates the reality of such effects. Aside from the fact that this approach has not been very successful so far, one might ask what the long-term results of such a finding would be. Some perspective on this question can be gained from history. Many effects that were once considered mystical have since been studied and understood by science. For example, lodestone (a naturally occurring magnetic mineral) has long been thought to possess some magical energy, but modern science now understands it within the highly developed context of electromagnetic theory. Similarly, gravity now fits within the scientific framework and there is a detailed theory of the shockingly strange phenomena observed at the quantum physics level.

In each case, science created a framework that described the phenomena and provided a basis for predicting certain effects. But of far greater importance is the recognition of what did *not* happen when scientific theories were built to describe the operation of nature. Forced into an atomistic, object-only framework, the discovery of new phenomena and principles typically did little to enhance our sense of wholeness and participation in a greater life. Instead, it only added incrementally to a growing picture of the universe devoid of the self and lacking meaning. As long as science insists on the objectification of reality, a philosophy of isolated components, and the separation of self from the universe, no real progress towards wholeness will be achieved. Science may extend life and increase production to support more billions on the planet, but our place within a universe of meaning will continue to fade into the grim worldview of post-modern existentialism. Meaning can only be found when we include ourselves in the universe, and discover how we participate in the life of the whole. From this honored position will come an appreciation of our role as conveyors of subtle energies, and a respect for the mystery of life that is both us and something greater than us.

Opportunities to grow into an understanding of wholeness have appeared at several junctures in the history of science. When no supporting structure is available to promote these opportunities, they typically fade into obscurity as popular worldviews continue marching along. For example, phenomena at the quantum level are perhaps some of the most logic defying ever encountered. Pioneers like David Bohm recognized the importance of the paradoxes they exhibited. Although scattered voices like his pointed out what these results might mean in human terms, science simply took the tools developed in the discipline and ignored the way the concepts challenged our view of the universe. For example, the now-proven fact that the observer is an essential part of any phenomenon seriously undermines the “object-only” world that forms the basis of current scientific thinking.

Quantum mechanics has revealed another intriguing paradox: Events can be instantly related even when they are so distant that even a signal at the speed of light could not communicate between them. For example, if two photons (light particles) are created together, their properties can bear a fundamental connection even though they are separated by large distances. When properties of one photon are measured, the measurement instantly forces the companion photon into a certain state. Einstein observed that “these telepathy-like relations suggested that ultimate reality should be attributed not to the physical objects themselves but rather to their relations with other objects. *In other words, relations are more fundamental than the relata, and the essence of an object is its connectedness and dependency within a complicated web of interrelations.*” [Einstein and religion by Max Jammer, p. 236.] Yet, the deep significance of this observation towards a science of the whole was never pursued. It remains now only as a historical footnote.

The point of this section is simply that the discovery and scientific explanation of new phenomena will not necessarily impact the way the physical science community sees the world. We have fallen, during the last centuries, into a scientism that is built on a Cartesian separation of the world into objects apart from the observer, and a philosophy of parts having precedence over the whole. Whether or not social scientists are able to reach beyond this viewpoint, the physical sciences continue to incorporate it as the conceptual framework from which “truth” is derived. It is not the fact that the study of nature strips meaning from life, it is that the premise upon which this study is conducted *a priori* removes us from our place in the life of the universe and denies the uniqueness of the whole.

Our first task should be directed towards bringing wholeness back into the pursuit of science. Less emphasis should be given to the effort to force subtle energy phenomena into a framework of knowledge that may render such phenomena invisible simply because it gives primacy to parts. Science is already producing miracles at an astounding rate. While we so quickly embrace the benefits of each new discovery, it is the self and our sense of meaning that suffers as every disease, bodily process, and even our thoughts and emotions are objectified. A cure for that dire affliction will not come in the form of another discovery, but from healing the deep dissociation of self and universe that underlies our way of searching for truth through science.

How Biodynamics Can Shift the Paradigm

“Our true human nature mirrors nature’s order and design which reflects the process of whole-making, the energy of stable yet unfolding systems. Creation itself is an act of giving – from nothing to something, and from something to a system. Health is the unified flow and function of a finite human creative system that is self-correcting and sustaining.”

- John Fetzer

The key to the transformation Mr. Fetzer was seeking will be found in broadening the perspective of scientific research. Such a transformation will not negate the knowledge gained over the past several centuries, but will expand it by awakening the scientific community to a greater dimension of understanding. Relativity theory, for example, supplanted Newtonian mechanics by showing that the Newtonian approach addressed only part of a larger reality. The remarkable and mind-twisting effects of special relativity are only easily apparent at extremely high velocities. In every day life, these effects are just as real, but so small as to be almost impossible to measure. Newtonian mechanics remains as useful as ever for calculating trajectories of baseballs, airplanes, missiles, and raindrops even though everyone now knows it to be only an approximate understanding.

A similar new dimension must now be added to the current scientific mindset. As outlined in the previous several pages, when we are operating at the level of parts, the life of the *whole* is all but invisible. Emergent dynamics occur in systems where there may be strong, almost completely random interactions between the elements. The non-random organizing activity, while almost imperceptible at the level of parts, is obvious when one views the activity or “life” of the whole. The key is recognition of this principle and the guidance it provides about new ways of looking. We do not expect to displace the reductionistic methods of science that have proven so useful, but to help show that they are capable of revealing only a partial understanding of reality.

One of the clear messages of nonlinear dynamics is that qualities emerge on many levels and restriction of our search to a single level will not elucidate the others. Emergent properties demonstrate unequivocally that no single level of observation or understanding is more fundamental than any other. Although there are glimmers of such an understanding showing up occasionally within the scientific community, very few have begun to grasp or even explore the deep implications of this principle. It shows us literally and understandably, for example, how the life of the individual and the life of the community are inextricable. Further, it resonates completely with Mr. Fetzer’s understanding that we are “all of one body.” While we all know that our thoughts, emotions, and relationships with others affect our health, a conceptual framework for understanding the interconnections between these different levels will open completely new perspectives and opportunities for health and healing.

Aside from the importance of advancing the scientific perspective, we should also take time to enjoy the view from this vantage point. A century ago, scientists were faced with experimental results they could not explain with the currently available science. A number of great minds rose to the challenge and developed a completely new and shocking way of seeing the world.

The result was quantum mechanics, which has provided the world with a wide array of new technologies. It also presented a philosophical challenge that has never been fully addressed even though isolated pioneers like David Bohm tackled the problem for a lifetime. We now face another type of unexplainable phenomena we may call “subtle energies.” This time, the observations come not from the laboratory, but from the lives of so many in this age who are exploring deeper dimensions of self and the “something greater” that is called by many different names.

The challenge of our age is even more demanding than the one presented at the beginning of the twentieth century. Now the limitation is perhaps not with our physics itself, but with the very tenets and philosophy of our way of seeking scientific truth. We have developed over the centuries the concept that all truth is found through the study of parts. This approach typically involves sophisticated methods for isolation of components to study the laws of interaction that govern them. Nonlinear dynamics is offering a new perspective showing that emergent properties are lost or totally obscured through this process, and further, that large-scale organized behavior may arise without the need for any new and unknown forces. This is the first building block needed for the development of a science of the whole.

Our vantage point is the recognition of the life of the whole and the impossibility of understanding its entirety through reductionistic scientific methods. Although nonlinear dynamics has received significant publicity (e.g. “chaos theory”), its implications for understanding wholeness and subtle interactions have only been touched upon by a few. The concepts are now mostly subsumed by the dominant reductionistic view that considers it largely as a novelty area relevant only to a few very special cases. We do not yet know how far-reaching the consequences of the dynamical view will be, but most important from our perspective is that all things living operate in this domain. Our core interest is in living beings, groups, and communities, and within these realms, nonlinear interactions certainly form the basis of the complex behaviors we all experience.

Modern biology currently remains enamored with the wonders of the genome, but forefront thinkers recognize that the mechanistic approach is about to face an enormous challenge. The gulf between DNA and a living human being is unfathomable based on present scientific concepts. An understanding of self-organization will certainly be needed to begin untangling this complex picture. A science of the whole will embolden researchers to consider the simultaneous orchestration the many levels of function in our bodies. From the thousands of biochemical interactions making up the life of the cell to the life and function of tissues, their cooperation in the life of organs, and the overall harmony and wholeness we know of as health, self-organization is central to biology. The 2000 Fetzer Biodynamics III workshop ended with a discussion of the possibility of creating, for the first time, a *theory* of biology – a coherent understanding of organized function across many levels of integration.

On the surface, these observations may be seen simply as advances in biology and medicine, but the true implications are much deeper. Once one admits to the principles of nonlinear dynamics, the resulting worldview is completely transformed. Integration across scales means that the life of the cell and the life of the community are of one whole. The interconnection of all of life is no longer only a philosophy, belief, or subjective experience, but a physical reality as

well. Nonlinear dynamics also provides the basis for many of the details of our experience that are currently so difficult to explain scientifically. It shows how the tiniest of perturbations can completely change the course of large-scale events. It demonstrates how systems can obey physical law while being unpredictable, but not random. These and other results from nonlinear dynamics have not yet effectively informed mainstream science.

Mr. Fetzer's quote at the beginning of this section mirrors remarkably some of the key principles of nonlinear dynamics when he speaks of "the process of whole-making, the energy of stable yet unfolding systems." His understanding was so much in resonance with the principles of nonlinear dynamics that this quote was received wholeheartedly by physical and biological scientists during the introduction to our *Biodynamics III* Workshop. In this same quote, he casts into common language the concepts of emergence and dynamical stability, two central precepts of nonlinear dynamics. Aside from minor differences in language, it appears that this discipline provides the scientific framework for the work Mr. Fetzer envisioned.

The penetrating insights of nonlinear dynamics place this discipline in a unique position to catalyze the needed transformation of scientific inquiry. Although concepts like "the whole is greater than the sum of its parts" are familiar and meaningful to almost everyone, there has not been, before now, a consistent way to study these commonplace truths. Nonlinear dynamics has already described the workings of many processes that bear a remarkable similarity to our experiences in everyday life. These explanations – sometimes relatively precise, sometimes metaphorical at present – represent the first real connection between our subjective experience of life and a scientific discipline. Nearly all of science before now has addressed the workings of the mechanical side of life, that is, how objects behave under the influences of various forces. But science has never adequately addressed the fluidity and subtle patterns we experience daily. All of the laws of science and probability are defined in the absence of conscious influences. The great prime mover or "God" of randomness can only be invoked when we are kept at arm's length. Nonlinear dynamics, in contrast, enables us to find a subtle order operating amidst the din of random interactions. A seeming randomness, we are finding, can co-exist with the emergence of higher orders of reality and wholeness not apparent from the study of parts.

Science as a discipline has become so important and so successful that it is now the single universal language spoken throughout the modern civilized world. While spoken languages, culture, and beliefs vary across regional boundaries, scientists from all countries participate in the exchange of ideas and agree upon a single concept of reality. Because of its central position and success, physical science perspectives cannot be easily changed by the work of other disciplines or by subjective experiences in the general population. The power of nonlinear dynamics to introduce real change results from its scientific and mathematical formulation of truths already evident in our everyday experience. Thus, it provides the groundwork and can serve as a credible vehicle for insightful scientists to introduce and develop a transformative science of the whole.

The full realization of wholeness in all our realms of study and endeavor is more a vision than a specific goal. As with any worthwhile pursuit, success will be built upon a foundation of honest work. Nonlinear dynamics provides the first scientific framework for pursuing wholeness and

subtle energies. It is difficult to fathom the healing power that this understanding might have on our society. What would life be like if scientific understanding flowed seamlessly into our deepest traditions of interconnection and wholeness? How might we be transformed if science supported, rather than denied the unity of life and the importance of our thoughts, feelings, and actions? What new approaches to health and healing might we discover? Within this context, an understanding of subtle interactions can be enthusiastically pursued.

Part III.
Facilitating a Transformation

The search for truth is more precious than its possession.

- Einstein

The original assignment for this report was to re-envision Mr. Fetzer's interest in subtle energy phenomena in the light of recent findings and understanding. In a question, how can we discover and begin to understand the biology of subtle energy phenomena? From a number of different perspectives, we have explored the limitations of the current scientific construct and the ways it has inhibited the development of thinking that might illuminate subtle energy phenomena. We have also suggested that some of these phenomena might not involve new forces, but rather may reflect a hidden order or larger-scale emergent behavior not yet perceived. Thus, the most efficient path to an understanding of subtle energy phenomena is also the road to a science of the whole.

Drawing a parallel between personal and collective growth provides some useful insight in this discussion. An individual may engage in certain behaviors that result in chronic problems in their life, but be unaware of the behaviors (or their underlying causes) that are creating the problems. The source of their difficulties remains mysterious until a healing occurs and a deeper perception is attained. This journey to wholeness involves many steps including acceptance, love, awareness, and courage to change. Seldom can these steps be forced, though often they are facilitated by those around us who love, exemplify their understanding, meet us as companions on this journey, and work within the spirit of life rather than trying to command it. By discovering a greater wholeness, the once invisible negative behaviors come to light and a greater freedom becomes possible. The mystery of our hardship dissolves. Such a transformation often includes an increased awareness of another mystery – the presence and source of positive forces working on our behalf.

We may apply this metaphor to our collective difficulty in understanding subtle energy phenomena. Though science has revealed an immense and detailed description of the workings of nature, most of life remains a mystery. We experience many forces at work in our lives that resist all our efforts to mentally grasp and control. Our efforts to apply scientific methods to these subtle phenomena have been similarly ineffective. Stepping back and assuming a larger view, we are suggesting a different approach. Rather than attempting to force these currently invisible forces into view, it is now time to address the deep healing that is needed. The human psyche has been rent by the separation of the world into material and non-material qualities. This divisive viewpoint was perhaps an essential step in our growth, but it now acts as an impediment to further understanding. Somehow, currently beyond our mental grasp, the "spiritual" and "material" aspects of life are inextricably woven into the same fabric. To deny this ever-present reality is to exile ourselves to the confines and contentions of duality.

Are we now ready to reach for a deeper level of understanding? Is it possible that we can grow naturally beyond the habit of defining truth through opposites and exclusion? The current rift between the “spiritual” and “scientific” pursuits of truth reflects a deeply ingrained mental construct and a false division of reality into parts. But once we recognize this fracture in our thinking, it becomes an invitation to walk boldly onto the path of healing. The Fetzer Institute is well positioned to participate in and support this journey and to create opportunities for others to experience and expand the vision. The work will occur both within the Institute and through interactions with others. This section outlines some possible next steps towards this vision.

The Fetzer Laboratory

In the end, this leads us to an understanding that we are not the creative source, but the community of relationships through which the work emerges.

-Rob Lehman

We opened the Biodynamics III workshop with Rob’s quote to remind participants that not only were they reporting about dynamical processes, they were *participating* in one. We invited them to be alert to what might self organize and emerge from the interaction. These comments were greeted by nodding heads and a comfortable recognition of this truth. Everyone knew that the quote came from someone outside the scientific community working in a different realm of knowledge, but the group was already familiar with the broad applicability of nonlinear dynamical concepts to other areas of life experience. This brief interaction was an encouraging example of how the dynamical view can form a bridge between different worlds. The participants included leading scientists and administrators deeply invested in the scientific approach to truth, but working from the broader perspective provided by this way of thinking.

In this same spirit, the Fetzer Institute can serve as a laboratory or incubator for many of the concepts discussed in this report. First is the opportunity for the physical science program and other program initiatives to recognize that our various pursuits of truth and wholeness are motivated by a common intention. During August, I spent a week in Kalamazoo to learn more about ongoing programs and to interact with the Fetzer staff. Everyone was exceptionally receptive and interested in continuing such a dialogue. Cross-fertilization of this type helps to eliminate former boundaries and stimulates ideas for working together to bridge the false, but long-standing divide between “spiritual” and “scientific” pursuits of truth.

Many concepts from nonlinear dynamics bear striking resemblance to our everyday and more mystical experiences, as discussed earlier. In some cases, scientists are studying particular phenomena and evidence is accumulating to support our intuitive recognition of this similarity. For example, the Institute is supporting research by Ary Goldberger at Harvard to study changes in nonlinear measures of heartbeat that occur in individuals during meditation and also changes that occur during disease. Early findings suggest that healthy hearts exhibit a subtle, but important chaotic irregularity. A very regular heartbeat is a strong predictor of disease. Other measures of health have also been found to display irregularity when systems are functioning properly and regularity when they are failing.

In other cases, the similarities between a dynamical perspective and life experiences can only be viewed as metaphors. A metaphorical view, however, may also prove to be quite useful in stimulating new insights. The principles of self-organization may suggest conditions and types of interaction more conducive to the emergence of new forms. Dynamical systems are strongly affected not only by the interactions between elements, but by the “boundary conditions” or limits imposed on the processes. Such observations may suggest innovative ways of improving group interactions without difficult rearrangements or the need to force major structural changes. The exploration of these new concepts can be a shared endeavor that serves to both advance the Institute’s work and bring groups together.

New research findings will serve to continually stimulate this process. For example, researchers in Romania have recently described and explained a fascinating phenomenon that occurs in applauding audiences. The clapping of the audience alternates between synchrony and asynchrony because of two opposing desires. Apparently, the audience desires to synchronize their clapping, but when this happens, the clapping rate decreases and the sound level of the clapping also decreases. The reduction in sound inspires the audience to clap more frequently (to produce more sound), but this effort (and faster clapping rate) causes a desynchronization of the clapping. The overall result is a rhythmic movement in and out of synchrony.

While all of us have participated in this audience dynamic, we were likely unconscious of our role in acting out the life of the group. We did not see our actions as either being influenced by or contributing to this subtle larger scale organization and activity. Though we generally regard ourselves as individuals, a science of the whole now offers the possibility of recognizing and understanding the long-held insight of spiritual traditions that we participate in a greater life than our own. The example of audience clapping, by itself, may have little importance, but it begins to reveal the hidden order in group dynamics. Understanding such order and dynamics can help us within the Institute and in other settings to find greater harmony and awareness in working with others. This new thinking offers an opportunity to explore an original way of understanding truths that have only been accessible to us through intuitive approaches.

As this movement towards a science of the whole unfolds, there will be other useful intermediate benefits both within the Institute and for society. Biodynamics has already shown us that increased complexity is often associated with health. A healthy heartbeat, as described earlier, is chaotic, while a more regular heartbeat portends heart attack. Individuals entering seizures and other brain dysfunctions show decreases in the complexity of their brain waves. One might speculate that the role of complexity in health is far more universal. For example, we may seek new experiences, change, and adventure to increase our complexity. Some researchers have noted that the brain waves of women typically exhibit greater complexity than those of men. Perhaps a benefit that men derive from being in the company of women is an increase in complexity as they attempt (perhaps with futility) to understand. Why women enjoy the company of men may have to remain a mystery for the time being.

We all know that one of the most unpleasant experiences in a conversation can occur when the listener reduces a complex insight we are having to a simplistic idea. On the other hand, true listening may require us to increase the complexity of our understanding. While the ideas

presented here are crude speculations, it seems very likely that group dynamics will benefit enormously from the ideas and metaphors of nonlinear dynamics. Perhaps exercises to increase our capacity for complexity or to avoid complexity-reducing behaviors can greatly enhance mutual respect and understanding in groups.

Within this more holistic framework, it seems certain that the current scientific move to strip meaning from life and reduce its workings to a simple clockwork machine will be recognized as clearly *unhealthy* for human beings. And similarly, the need for many people to reject a compulsively reductionistic science view will be seen as a positive movement towards health and survival. But as with any fracturing of the psyche that is created in response to irresolvable conflicts, true healing will only occur when the heart and mind can reunite in wholeness. One step towards such unity will be the development of a scientific language of wholeness. As Einstein reminded us, *“Most of the fundamental ideas of science are essentially simple, and may, as a rule, be expressed in a language comprehensible to everyone.”* Within the Fetzer Institute – itself a laboratory – we have the opportunity to explore and develop this approach to greater health of body, mind, and spirit.

Creating Space for Emergence of a New Perspective

Everything that is really great and inspiring is created by the individual who can labor in freedom.

- Albert Einstein

Scientists in today's world find themselves facing powerful constraints to free and open thinking and research. As discussed throughout this document, there is a deeply ingrained mindset in modern science based on reductionism and the “clockwork” view of the universe. All activity, including life, is believed to arise ultimately from the randomness or the “noise” of the universe, and to be explainable in terms of natural laws governing the component parts. A basic tenet is that there is no meaning nor is there purpose to anything that happens. The individual is now believed to be simply a chemical product of DNA that evolved by chance in response to environmental pressures. Beliefs outside this worldview are considered primitive and dangerous.

This conceptual structure is so strong that it defines the boundaries of acceptable thought. As the logical framework for ideas, it also serves as the basis for the organization of science. Research funding, for example, is designed to support only those scientists who incrementally add to the growing compendium of component-based knowledge. Researchers joke openly about how to obtain funding from the National Institutes of Health. The prescription is clear: The ideas must be only marginally innovative and the research must be already close enough to completion that success of the project is almost guaranteed. Policies vary among the funding agencies, but the overall effect is that science funding acts as a major constraining force on research activities. It supports work that reinforces the existing viewpoint, and leaves little room for truly original efforts that even hint at an understanding outside the current paradigm.

Scientists are required to obtain outside funding for their work, implying that professional survival depends on their adherence to the accepted conceptual framework. Thinking outside the box is widely known to destroy one's opportunity for funding from government or other traditional sources. By providing limited funds for credible research that broadens the current perspective, the Institute breathes a dramatically different energy and intention into the picture. Funding and credible research are together the currency of modern science. Properly employed, these elements can enable the scientists who are ready to step out of the orchestrated march of mainstream science and explore the interconnectedness of life that true science is beginning to reveal.

Scientists are impacted almost exclusively by the work of other scientists, and even outstanding efforts by those outside of the physical and biological sciences will have little effect on the scientific perspective. This fact is well illustrated by the reaction of scientists to expanding awareness and different ways of knowing in other sectors of society (e.g. spirituality and alternative health practices). The science community reacts by more adamantly defining and promoting science as the only way of knowing. Change must come from within the scientific community and it is for this reason that the Fetzer Institute will find the greatest success by positioning itself as a credible contributor of real science.

A transformation to a science of the whole will require two elements – demonstration of novel scientific results and the promotion of new ways of seeing, interpreting, and understanding these findings. The Fetzer Institute's work in the physical sciences should include these two major thrusts. First, impeccable research is essential in order to establish and maintain credibility. The second major thrust is the support of a space in which new ideas and ways of seeing can grow and flourish. History is spotted with lone voices of enlightenment from courageous individuals who often suffered for their willingness to think differently. As discussed above, dominant paradigms in a society maintain stability by reinforcing current views and ostracizing radical perspectives. It is likely that there are substantial numbers of scientists contemplating a broader understanding but with too little interaction with others to truly nurture and develop these ideas. Few will go outside their scientific peer group for such support, and if they do, the effect is to compartmentalize perspectives and use only the accepted voice of science in scientific circles.

The Institute can make a major contribution by building a safe environment for competent, working scientists to explore and expand these new frontiers. Elements of this effort include meetings, workshops, and the promotion of networks of individuals. Fellowships and other methods of encouraging young scientists are similarly essential.

Targeted Research

Science without religion is lame; religion without science is blind.

- Albert Einstein

Before discussing possible future activities in the physical sciences, here is a brief assessment of where we are now: During the last several years, the physical sciences program within the

Fetzer Institute has grown from an obscure position in the fringe sciences to a prominent and respected position in cutting-edge research and related activities of unassailable quality. The Biodynamics laboratory at Stanford University has pushed forward the frontier of science with innovative research and important publications in prominent scientific journals. The high quality of this work is widely recognized by researchers in this field, and it has enabled us to speak with a credibility that simply would not be possible otherwise. In science, as in other fields, doing and talking are not on par. As doers, we demonstrate the level of commitment and integrity necessary for leadership.

The beauty of the approach discussed in this document is that *it is not anti-science*. As real, believable science, it is accessible to anyone interested in pushing forward the limits of current thinking. It means that we are not promoting fringe areas that prompt strong, negative reactions from the mainstream science community. We are instead creating a space from which this work can be performed, made public, and discussed. The recent publication of *Self-Organized Biological Dynamics and Nonlinear Control* by Cambridge University Press was a prominent step in building a foundation for the new conceptual framework that is needed in science. We have also awarded a number of postdoctoral fellowships to outstanding young scientists working in this area. They have published a substantial body of important work and then moved on to become productive and enlightened members of the scientific community.

This past August, we held the third *Biodynamics* workshop at Seasons. These workshops have clearly served as a focal point for forefront thinkers and have raised the level of discussion within the community. A remarkable quality of the most recent meeting was its inclusion of scientists from a wide range of disciplines. Biochemists, physicists, biologists, endocrinologists, cardiologists, ecologists, and psychophysicists, many of whom did not know each other, came together and shared their insights and findings. The power of the dynamical perspective was vividly apparent – across all these specialty areas, everyone was speaking the same language. In most conventional science settings, researchers from these various disciplines have little in common and the language idiosyncrasies of their disciplines make communication difficult. The Biodynamics meetings have had a striking effect on the participants. Everyone leaves with new ideas and perspectives, new colleagues, and a deeply expressed sense of gratitude for the opportunity Fetzer has provided. Four years after the first of these meetings, we continue to hear positive feedback and to see the results of new collaborations formed at that meeting.

Our attention now turns to the next steps needed to advance a science of the whole. Listed below are a number of areas for further work. They are offered as the starting point for discussion.

1. Core Research at the Stanford Biodynamics Laboratory

Research is not a systematic occupation but an intuitive artistic vocation.

- Albert Szent-Györgyi

As discussed above, Fetzer's stake in a core research program creates the ground of credibility needed as we build the foundations of a science of the whole. Small, short-term funding efforts have specific advantages, but certain elements of success require longer-term, stable research programs. Scientists relying mostly on public funding for support must make the seeking of such funds their first priority. They are generally forced to conform to the dominant mindset of the day, and can at best take on only sideline efforts outside of this approach. By funding an independent laboratory, we are able to push significantly ahead of current thinking and demonstrate important results that impact the community. The Stanford laboratory serves as a beacon revealing the existence of solid ground on which a new structure of thought can be built.

The stability and success of this laboratory not only builds Fetzer's reputation for impeccable science, it makes possible the conduct of major research thrusts that cannot be developed in one or two years. It creates a core space that serves as an example for the freedom of thought and sense of true exploration we are attempting to bring back to the sciences. It is recommended that funding for this laboratory continues and that further opportunities for its role be explored. For example, limited support could be provided to visiting scientists for extended stays at the laboratory. The active exchange of ideas and collaborative effort will build community and promote new ways of thinking.

2. Dialogue

If scientists could engage in a dialogue, that would be a radical revolution in science – in the very nature of science.

- David Bohm

The Fetzer Institute has long worked with dialogue as an effective way of building community, breaking new ground, and allowing the greater wisdom of the group to emerge. As David Bohm recognized, dialogue is sorely missing in the conduct of science. Scientists actively engage in conversation at technical conferences and similar meetings, but underlying these discussions is generally a competitive spirit and a strong adherence to the tenets of mainstream thinking. There is little room for ideas that stray from the boundaries of the prevailing paradigm. Lively conversations about the deep implications of scientific ideas, like those that surrounded the discovery of quantum mechanics, are not part of the life of most scientists.

The Biodynamics workshops have served to enhance dialogue among participants, but formation and support of a broader community will require further steps. One intriguing possibility is to develop a science component of the Fetzer fellows program. The Fetzer fellows program has included scientists in the past, but the concept presented here is aimed specifically at building community. Because scientists need resources to make real progress, the science fellows program would benefit from an enhanced stipend. For example, a stipend of \$50,000 per year for two years would enable scientists to free up some of their time and hire a graduate student or assistant to focus on interesting problems. Underlying this idea is the assumption that many innovative scientists have ideas they would love to pursue, but that would not be

acceptable to mainstream funding agencies. We could identify and focus on those scientists whose “heart” ideas lead in the direction of a science of the whole.

Science fellows under this program would meet at least twice per year and engage in true dialogue regarding their thinking and their work. The program might include approximately 10 fellows at a time. Working with the Biodynamics group and other interested staff at the Institute, this group would form the nucleus of a broader community working in an atmosphere of freedom and spaciousness.

3. Publications

Publications will also help to firmly establish the concept and relevance of a science of the whole. In addition to the scientific papers already published and our book from Cambridge University Press, we could explore opportunities for other significant publications. These publications will individually and collectively begin to define the meaning, insights, and implications of a science of the whole, and will help attract interested scientists in this work. One possibility is to write a book exploring this topic, building on the ideas outlined in this document. It could result from dialogues within the Biodynamics group and among fellows. Although certain components of the ideas presented here are currently available in books and scientific papers, a coherent elucidation of the concepts would create a focal point for discussion.

4. Postdoctoral Fellowships

The Fetzer Institute has awarded several postdoctoral fellowships to new Ph.D.s working in the area of bioelectromagnetics and biodynamics. Applicants for these fellowships have been required to collaborate on experimental projects that included magnetic field effects in biology. While the program has been successful in identifying highly qualified individual so far, there are currently fewer laboratories performing research in the area of bioelectromagnetics. The postdoctoral fellowship program could now be broadened to include other topics that will advance a science of the whole. Details of the program can be determined by the Biodynamics Group, but some possibilities are presented here. Candidates may propose innovative projects to study effects and practical applications of weak perturbations, local measures of coherence in large-scale emergent phenomena, or ways to study rare events (levy tail distributions) in experiments. The success of the program over the last few years resulted partly from a requirement that theorists team with established experimental laboratories. It may be possible to extend this theme to other fruitful variations such as pairing individuals from different disciplines, or encouraging other types of interdisciplinary studies linked through the common language of nonlinear dynamics. Possibilities for the most effective form of the fellowships could be explored and refined over time, but the fundamental usefulness of this program component is clear. It stimulates interest in the area and encourages exceptional young researchers to consider the area. Providing such opportunities early in the career of these scientists is particularly important as it enables them to direct their enthusiasm for the area before it is subsumed by other professional demands.

5. Opportunities for Biomedical Advances

As mentioned at the end of section II, a science of the whole raises intriguing possibilities for medical applications. This conceptual framework may well dissolve the barriers between the physical, biological, psychological, social and other sciences. With such an understanding, medicine could be substantially transformed. An understanding of biodynamics will lead us towards minimally perturbing therapies that recognize the whole of an individual's life. While many in modern medicine (and certainly in traditional medicines) have already recognized the importance of treating the whole person, there has so far been little systematic or scientific basis for addressing this greater perspective. Fellowships, as discussed above, or targeted research projects could be used to encourage work in this area. The unique contribution of the Fetzer Institute in this area is the credible development of a scientific basis for thinking and working from the whole.

To briefly summarize, the Fetzer Institute's recent work in the physical sciences has been credible and appreciated by the scientists it has affected. It has advanced a conceptual framework (Biodynamics) that is very much in harmony with Mr. Fetzer's views toward wholeness and subtle energies. Our greatest contribution to unraveling the mysteries of subtle energy phenomena will most likely come from finding new ways to enhance our perception of the seamless connection between the "scientific" and "spiritual" views of life. An understanding of subtle energy phenomena may only be possible through a re-integration of these perspectives, and for the first time, the necessary scientific elements may be available. This exciting exploration is one that can be shared by everyone within the Institute, and one that may facilitate a deep healing within our culture. It offers the possibility of creating a working understanding of our interconnectedness and our participation in a life greater than our own.